



Advanced Planning Brief to Industry

*Joint Intermediate Force
Capabilities Office*

21 Sep 17

<http://jnlwp.defense.gov/>



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Core Mission and Investments

- **The Joint Non-Lethal Weapons Program** stimulates and coordinates non-lethal weapons requirements of the U.S. Armed Services, Coast Guard, and Special Operations Command and allocates resources to help meet these requirements
- **The Joint Non-Lethal Weapons Directorate** serves as the Department of Defense Non-Lethal Weapons Program Executive Agent's day-to-day management office

Science and Technology Investments

- Identify, mature, and demonstrate non-lethal technology solutions to address current and future capability needs
- Conduct applied research and develop methodologies and modeling tools that characterize NLW human and materiel effects and effectiveness

Research and Development Investments

- Facilitate development of new capabilities from Pre-Milestone A through the Technology Maturation and Risk Reduction Phase up to Milestone B
- Assist the Armed Services, Coast Guard, and Special Operations Command in transitioning projects to operational capability



Joint Non-Lethal Weapons Program (JNLWP) Focus Areas



Counter Personnel (CP)

- Deny areas to individuals
- Move individuals
- Disable individuals
- Suppress individuals



Counter Materiel (CM)

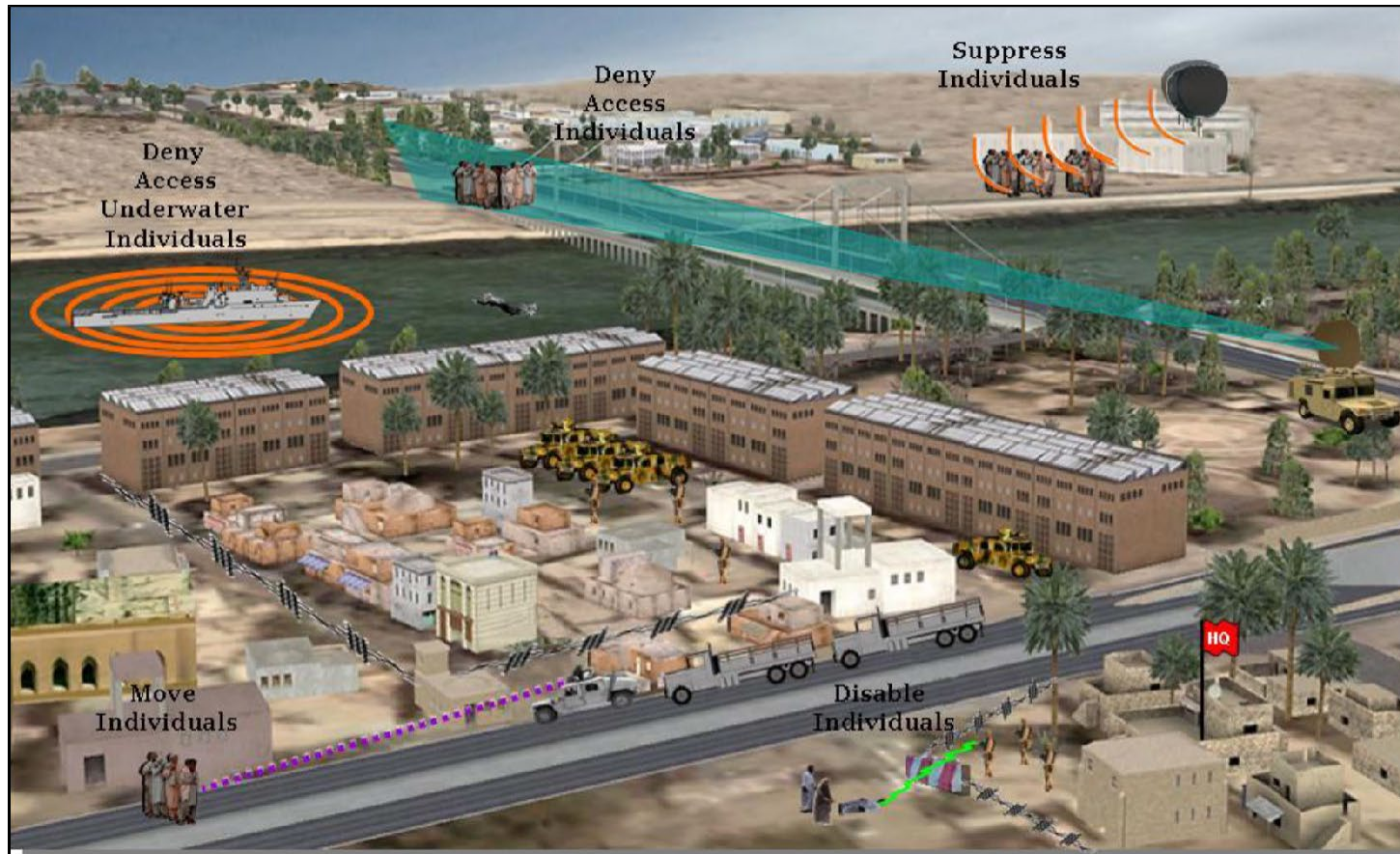
- Stop/disable vehicles
- Stop/disable vessels
- Stop/disable/divert aircraft
- Deny access to a facility

Key Attributes: Incapacitation and Reversibility

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Operational View: Capabilities-Based Assessment (Counter-Personnel)



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Operational View: Capabilities-Based Assessment (Counter-Materiel)



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Example: Emerging NLW Capability

High-Power Radio-Frequency Vessel Stopping (HPRF)

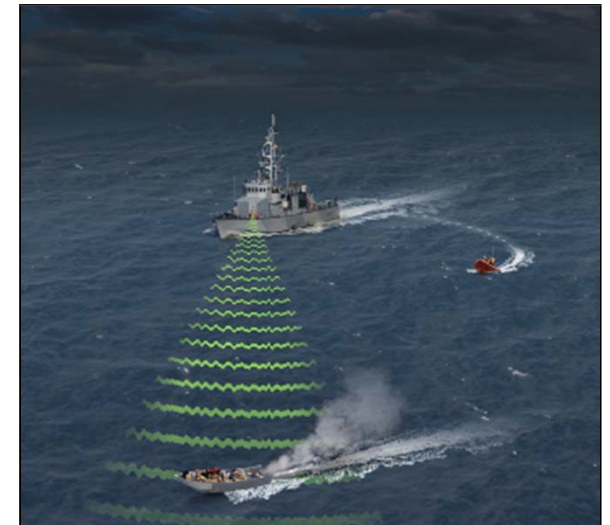


DESCRIPTION:

Design and develop a non-lethal vessel stopping capability that utilizes HPRF technology to disrupt critical engine control electronics to stop small vessels powered by outboard motors

OBJECTIVES:

- Disrupt and/or disable small uncooperative vessels in instances where Rules of Engagement may limit the use of kinetic weapon alternatives
- Provide a means to determine intent of inbound vessels, buying valuable time for wide variety of “escalation of force” options



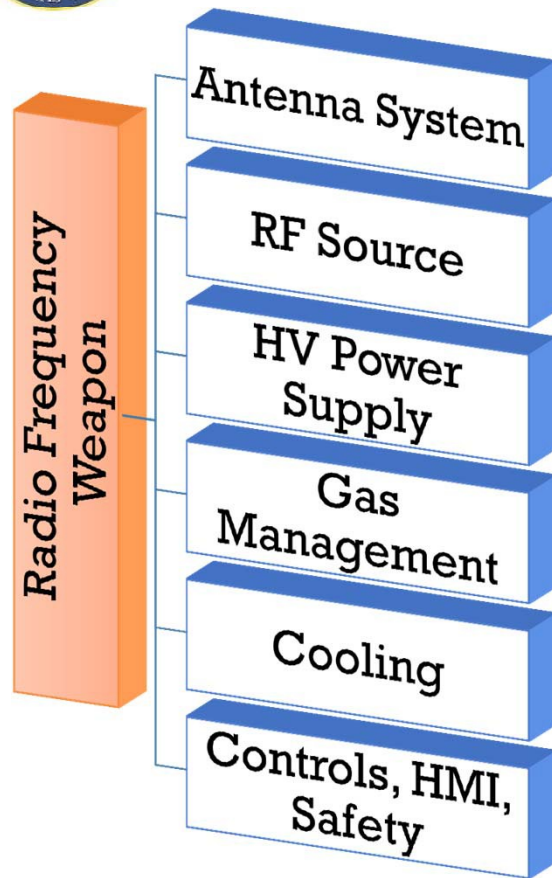
HPRF ADVANTAGES:

- Provides an extended range and 360-degree targeting (multi-target) capability
- Ability to immobilize targeted vessels
- Safe and reversible effects
- Pre-emplacement directly in front of the target not required

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Equipment Functional Decomposition



Provides gain and beam steering

Raw RF power. Options: solid state, klystron, and magnetron vacuum tubes

Converts shipboard prime power to the pulsed high voltage needed for the source

Critical for high-power RF system operation and long-term reliability

As with all electronic products, heat must be removed

Human Machine Interface (HMI) challenge: make the high-tech useful to crew who have other jobs



Key Requirements



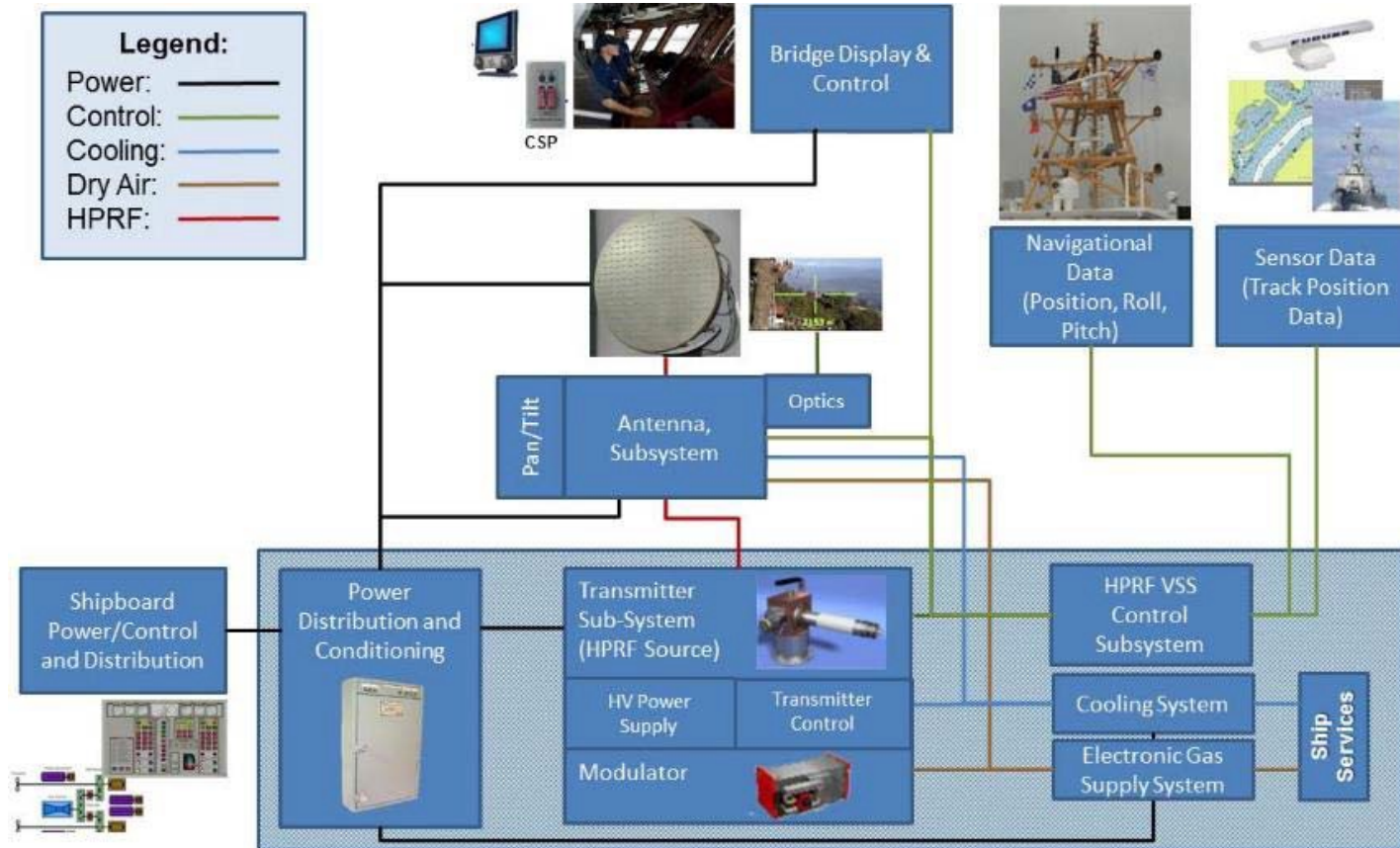
Operational Requirement	
Sea State	Three
System Weight	≤2200lbs
Vessel Platform	SL-120 (Cyclone-class size vessel)
Environmental	MIL STD-810G (Humidity, Green Water, Salt Spray)
RF Transmitter	
Transmitter	Magnetron
Transmitter PWR to Antenna	4-10 MW
Transmitter Tuning Band	2600-3950 MHz
Modulation	Pulsed
Antenna	
Antenna Frequency Range	2600-3950 MHz
Antenna Polarization	Horizontal
Horizontal Gain	30-33 dBi
Antenna Weight	≤400lbs
AZ/EL Articulation	Mechanical or Electrical (Range TBD)
Modulator	
Drive	4-10 MW
Pulse Width	Variable, Remote Programmable
Pulse Repetition Frequency	Variable, Remote Programmable
Voltage	Variable, Remote Programmable
Arc Detection	Yes
Voltage and Current Monitoring	Yes
Thermal Management Solutions	Yes
Sub-Assemblies	Modulator Assembly, High Voltage Power Supply
Input	440V/60Hz/3-Phase



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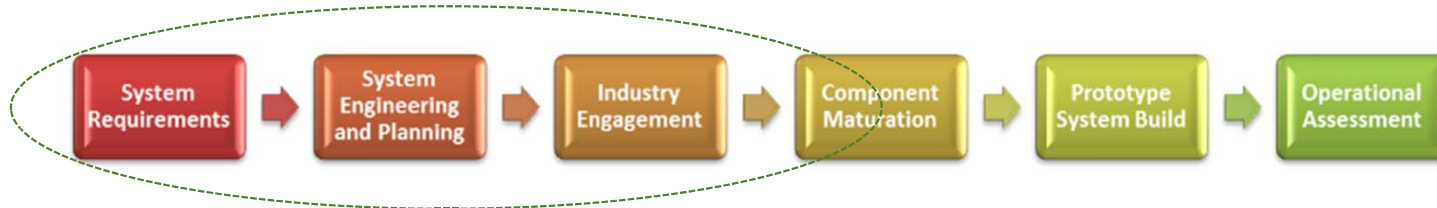


Basic System Block Diagram





FY 2018 Path Forward



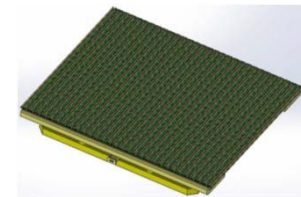
- *Identify the best commercial and government ideas and technologies for both the entire Vessel Stopping Prototype system and its components while refining requirements and maturing near term hardware solutions*

- **FY18 Focused Effort**

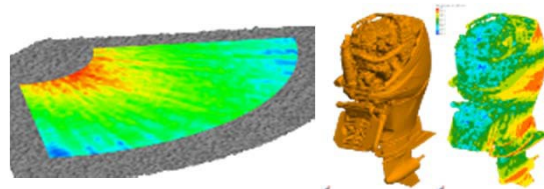
- *Formal and Informal Industry Engagement*
- *System Component Development*
- Systems Engineering and Planning
- Vessel Stopping Prototype S&T and M&S
- System Requirements Maintenance



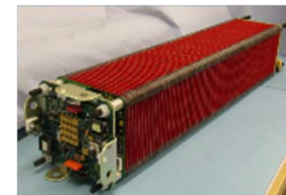
S-Band Slotted Array Vendor 1



S-Band Slotted Array Vendor 2



Sea Surface and Incident Field Modeling & Simulation



HV Modular Vendor 1

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Current/Planned Industry Engagement

Task, Milestone, or Deliverable	FY18											
	1st QTR			2nd QTR			3rd QTR			4th QTR		
Milestones / Decision Points	O	N	D	J	F	M	A	M	J	J	A	S
Industry Engagement												
Request for Information Execution												
Request for Proposal Execution and Analysis												
Independent Cost Estimation												

- RFIs released 2017
 - Solid State Modulator (AUG)
 - High Gain S-Band Antenna (AUG)
- RFIs planned for release 2017
 - Magnetron RF Source (SEP)
 - Thermal Management System (SEP)
 - Antenna Pan-Tilt Mechanism (SEP)
 - Complete HPRF System RFI (SEP)

- RFPs planned 2nd QTRFY18
 - Solid State Modulator
 - High Gain S-Band Antenna
 - Magnetron RF Source
 - Thermal Management System
 - Antenna Pan and Tilt Mechanism
 - Complete HPRF System RFI

- RFI response will shape RFP structure and engagement
- Industry Findings will encourage Industry vs Government Lead Systems Integrator decision making process
- *Contract Award FY19*



NLW R&D Indefinite Delivery/Indefinite Quantity Multiple Award Contract (IDIQ MAC)



- Broadly applicable but NLW-focused contract vehicle for accomplishing research and development objectives
- One-year base with four option years
- Four awards (29 June 2017):
 - American Systems Corporation
 - Applied Research Associates, Inc.
 - Applied Technology, Inc.
 - Booz Allen Hamilton Inc.



- Nine functional areas:

- 1) Electrical Stimulus-Based Disabling Technology
- 2) Active Denial Technology (ADT)
- 3) Blunt Impact Technologies
- 4) Laser Technology
- 5) Sound and Light
- 6) Other Counter Personnel Technologies
- 7) High Power Radio Frequency/ Microwaves (RF/HPM)
- 8) Other Counter-Materiel* Technologies
- 9) Human Effects

* Counter-Materiel targets may include vehicles, vessels, aircraft, unmanned systems, equipment, facilities and infrastructure

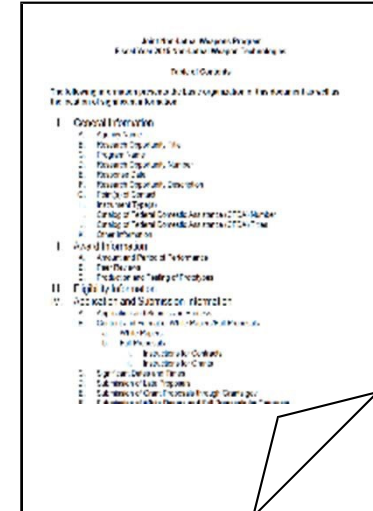
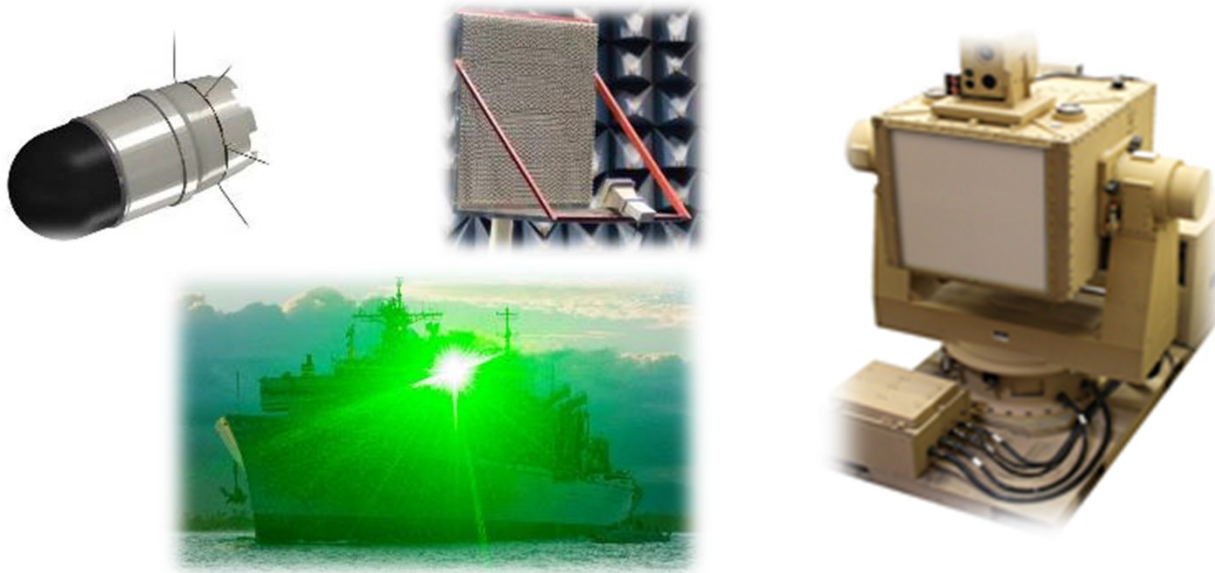
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NLW R&D Broad Agency Announcement



- Published every few years to stimulate new ideas and solutions to most challenging NLW R&D problems
- Casts the net wide to broaden the industry base
- Next BAA anticipated in FY19 timeframe; scope TBD



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How Industry Can Help



Electrical Stimulus-Based Disabling Technology

- Reducing components size and weight
- Improving flight stability and accuracy/precision
- Designing deployable-on-impact electrodes with reliable attachment
- Minimizing target risk of injury from electrodes
- Identifying, targeting and disabling multiple targets with single activation of device

Active Denial Technology

- Advancing thermal cooling solutions
- Advancing batter and prime power solutions
- Advancing w-band source development (vacuum electronic devices and monolithic mm-wave integrated circuit)
- Developing w-band transmissive armor
- Researching w-band radio frequency material properties and conducting modeling





How Industry Can Help



Blunt Impact Technology

- Developing new blunt impact munitions and/or launchers to address current performance limitations:
 - Natural trade-off between increased effective range (min and max) and the risk of significant injury
 - Accuracy/dispersion at longer ranges
- Minimizing logistics and supportability issues associated with enabling technology
- Developing solutions to reduce blunt impact injury and improve accuracy for other NLW stimulus delivered in a projective (e.g. flash bang devices, HEMI)
- Improving capabilities of blunt impact injury models and instrumented test targets



Laser Technology

- Creating plasma at distance with a retina-safe wavelength laser
- Making attention-getting bright light from laser induced plasma
- Originating alert and warning sounds from laser induced plasma
- Causing auditory discomfort for personnel near plasma created at distance
- Generating intelligible voice commands from creating plasma at distance





How Industry Can Help



Sound and Light

- Reducing Size, Weight, Power Consumption, and Cost (SWAP-C)
- Improving range and intelligibility
- Advancing stabilization and targeting
- Developing optical-aid safety mitigation technologies
- Transmitting intelligible sound through structural barriers



Other Counter Personnel Technology

- Developing compelling, yet non-irritating malodorants & dissemination devices
- Clearing a space without entering
- Denying access to facilities
- Developing capabilities for longer range and duration effects
- Countering-swimmers/divers
- Developing and integrating autonomous NLW delivery systems and payloads
- Identifying novel non-lethal effects
- Evaluating Innovative uses for existing technologies





How Industry Can Help



High Power Radio Frequency/Microwaves (RF/HPM)

- Developing light weight, compact, high power (MW to GW pk) antenna systems capable of providing beam steering and antenna stabilization
- Developing high energy/power-density modulators, pulsed power, power conditioning, energy storage, and prime power
- Developing electrically efficient, high power, frequency agile RF sources
- Developing and utilizing models to predict electromagnetic interaction with complex structures and system response
- Assessing target vulnerabilities and evolution due to technology advancement, commercial market drivers, and threat progression
- Assessing and developing spatially diverse HPRF attack concepts (i.e. swarming)



Other Counter-Materiel Technology

- Reversibly stopping vehicles, vessels, and aircraft
- Defeating unmanned craft at operationally suitable ranges
- Denying exterior access to facilities, vehicles, and vessels





How Industry Can Help



Human Effects

- Understanding of stimuli effects in terms of injury potential and weapon effectiveness
- Familiarity with Human Effects policy documentation (3200.19) and relevant implementation guidance documents, including the Risk of Significant Injury and calculation methodology related to specific stimuli
- Understanding the specific relationship between human effects readiness and technological readiness
- Establishing testable parameters from known physiological effects
- Understanding potential modeling and simulation necessities





Joint/Service NLW POCs



Service NLW Central Action Officers

Army: (573)563-7092

Navy: (703)692-1512

Marine Corps: (703)432-8461

Air Force: (210) 925-5015

Coast Guard: (202)372-2032

Special Operations Command: (813) 826-1229

Joint Non-Lethal Weapons Directorate (<http://jnlwp.defense.gov/>)

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QUESTIONS?